Space Weather Forecast

Issued on Wednesday, 20 December 2023 at 13:22 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of isolated Moderate-class flares throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar Activity is Low, with the peak common class flare at 20/0854 UTC from a region in the northeast. Ten sunspot regions feature on the visible disc. One in the southeast which is the largest spot on the disk and continues to grow and show increased magnetic complexity. One in the northwest is the second largest region, with a similar moderately complex magnetic structure. A recently developed region in the northeast continues to grow, with some complexity to the polarity of the small intermediate spots. The remaining regions are all smaller or magnetically simple.

No Earth-directed coronal mass ejections have been observed in coronagraph imagery.

Solar Wind / Geomagnetic Activity: The solar wind environment was characterised the waning effects of a coronal hole high speed stream, with a glancing blow of a weak coronal mass ejection from 15 Dec. Solar wind as measured by ACE at L1 declined from strong to slightly elevated levels. The interplanetary magnetic field was weak throughout, but briefly jumped to moderate at 20/0030 UTC. The north-south component of the IMF varied weakly, though with a notable change after 20/0030 UTC, with a sustained negative period. Resultant geomagnetic activity was largely Quiet to Unsettled (Kp 1-3), but with an Active (Kp4) interval from 20/0000-0300 UTC.

Energetic Particles / Solar Radiation: High Energy Proton flux has been at Background levels with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Low with a chance of becoming Moderate with isolated Moderate-class flares.

Solar Wind / Geomagnetic Activity: No Earth directed coronal mass ejections feature in the forecast. The Earth is currently connected to a coronal hole high speed stream. Speeds should slowly ease back to slightly elevated, or slow ambient through days 1 and 2 (20-21 Dec). The next potential coronal hole high speed stream is possible from day 2 (21 Dec) or day 3 (22 Dec). Speeds could peak between slightly elevated and strong levels. From day 4 (23 Dec), winds should trend back towards background levels.

Geomagnetic activity should remain largely Quiet to Unsettled during the period. There is a chance of peak Active conditions and a slight chance of a G1/Minor storm interval upon the arrival of the next coronal hole high speed stream days 2 or 3 (21/22 Dec).

Energetic Particles / Solar Radiation: Solar radiation storms are considered very unlikely.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	20	5	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	45	45	45	45
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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